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PATENT SPECIFICATION

(11) 1 201 918

DRAWINGS ATTACHED

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(54) IMPROVEMENTS IN OR RELATING TO VALVES FOR PRESSURISED DISPENSERS

(71) We, BESPAK INDUSTRIES LIMITED, a British Company of Fielding Road, Cheshunt, Waltham Cross, Hertfordshire, formerly of Acos Works, Eleanor Cross Road, Waltham Cross, Hertfordshire, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to valves for pressurized dispensers of the type now commonly known as "aerosol" dispensers, and more particularly with aerosol valves of the type which dispense a metered dose at each operation thereof.

In accordance with the present invention there is provided an aerosol metering valve for use with a container for pressurized material, the valve comprising a metering chamber, an outer and an inner annular seal closing the respective outer and inner ends thereof, a valve member co-operating with the seals and movable between an inoperative position in which the metering chamber is isolated from atmosphere and an operative position in which the contents of the metering chamber can be discharged to atmosphere while the chamber is isolated from the interior of the container, and resilient means urging the valve member to its inoperative position, and wherein the said seals have inner annular surface portions of substantially equal area exposed to the pressurized material so that both seals are affected similarly by any chemical attack and are of similar size and supported in similar ways so that both the seals are equally deflected when the valve member is operated.

Preferably the usual valve return spring is located outside the metering chamber, for two main reasons: first, to eliminate variations from the designed volume of the metering chamber due to variations in spring volume from one valve to another, and, secondly, to avoid direct spring loading upon the surfaces of the metering chamber and so obviate variations in chamber volume due to "creep" of the materials of which the valve components are manufactured.

Further features and advantages of the invention will appear from the following description, given by way of example only, of some metering valves in accordance with the invention, which are illustrated in axial cross-section in the accompanying drawings, in which Figure 1 shows one valve, Figure 2 a part of another, and Figure 3 part of a third.

The valves are generally similar in their construction and operation, and corresponding parts of the valves are identified, for convenience, by the same reference numerals in the different figures.

The valve shown in Figure 1 comprises a tubular body or cup 1 fitted with a bush 2 defining a metering chamber 3, which is closed at its upper and lower ends by seals 4 and 6, respectively. Extending slidably through both seals is a valve member 7 which is normally held in its upper, illustrated position by a coil compression spring 8, upward movement of the valve member being limited by a conical shoulder 9 making sealing engagement with the upper seal 4.

The valve member is formed with a radial discharge port 11 leading to an axial cavity 12, which leads in known manner to a discharge nozzle in an actuator button (not shown) mounted on the upper end of the valve member.

Also formed in the valve member is a metering passage comprising a pair of spaced radial ports 13 and 14 interconnected through a central cavity 16.

In the illustrated position of the valve, the metering chamber is isolated from the remainder of the interior of the dispenser by the lower seal 6, and from atmosphere by the upper seal 4.

The usual ferrule in which the valve is mounted and by means of which the valve is sealingly secured to the body of the dispenser is omitted from the drawings since it may be conventional in form.

It will be apparent from the drawing, that upon depression of the valve member against

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its spring 8, the following sequence of events will take place: first, the port 13 will be uncovered below the seal 6 to allow material under pressure to pass into the metering chamber, either to fill it for the first time or replace any part of the dose which may have seeped out following a previous dispensing operation; next the port 14 is covered by the seal 6 to isolate the metering chamber from the rest of the dispenser once more; and finally, the discharge port 11 passes through the upper seal 4 to permit the discharge of material from the metering chamber. On release of the valve member, the above described sequence is reversed, so that the metering chamber is refilled prior to the port 11 becoming open to atmosphere once more.

It should be noted that the seals are equally dimensioned and equally supported at their lower surfaces, so that any variations in flexibility of the seals (due to the material thereof being affected by the pressurized material) will be substantially equal. In particular, the inevitable dishing at the centre of the seals which results from depression of the valve member will be substantially the same at both ends of the metering chamber, whose total effective volume will therefore be largely unaltered throughout the life of the valve.

The valve shown in Figure 2 is essentially the same as that of Figure 1, except for the arrangement of the metering passage, which in this case is formed by a simple axial slot or recess 20 in the side of the valve member.

In a further modified form, not illustrated, the metering chamber may normally be in communication with the rest of the dispenser, through a single radial port (corresponding to the port 14) communicating with an axial passage extending downwardly through the valve member and open at the lower end thereof.

A further embodiment of the invention is illustrated in Figure 3 and is the subject of our co-pending divisional Patent Application No. 57212/69 (Serial No. 1,201,919). This embodiment shows principally the arrangement of the upper seal 4, other details being omitted for the sake of simplicity. The seal 4, which in its free shape is substantially flat, is constrained to the part conical form shown in the drawing. The conicity of the seal is selected so as to correspond with the maximum conicity which the seal would assume, in operation of the valve, it it were initially flat but free to dish downwardly.

This inward dishing is a well known phenomenon in aerosol valves and results, in the case of a metering valve, in a certain amount of lost-motion in the operating stroke. It also consumes some dead space in the metering chamber, so that by eliminating the effect, in the manner just described, the minimum dose size which can be delivered by a given value can be usefully reduced. In addition, the effects of long term variations in the flexibility and hardness of the seal material are eliminated or greatly reduced by pre-determining, in effect, the maximum deflection of the seal.

The arrangement of the bottom seal, (not shown in Figure 3) is substantially the same as that of the top seal.

The above described forms of the invention have the advantage of relative simplicity of manufacture and of correct assembly. By arranging the spring 8 outside the metering chamber, the minimum dose dispensed can be smaller than would otherwise be possible. The dose can be varied from one valve to another merely by alteration of the bush 2. Finally, the valves with similar seals at the top and bottom can be charged by pressure filling techniques without modification of the constructions described.

WHAT WE CLAIM IS:—

1. An aerosol metering valve for use with a container for pressurized material, the valve comprising a metering chamber, an outer and an inner annular seal closing the respective outer and inner ends thereof, a valve member co-operating with the seals and movable between an inoperative position in which the metering chamber is isolated from atmosphere and an operative position in which the contents of the metering chamber can be discharged to atmosphere while the chamber is isolated from the interior of the container, and resilient means urging the valve member to its inoperative position, and wherein the said seals have inner annular surface portions of substantially equal area exposed to the pressurized material so that both seals are affected similarly by any chemical attack and are of similar size and supported in similar ways so that both the seals are equally deflected when the valve member is operated.

2. A valve in accordance with claim 1, wherein the said resilient means comprises a spring positioned wholly outside the metering chamber.

3. A valve in accordance with claim 1 or 2, in which the inner annular seal is supported on one side against an annular abutment member extending over the whole of the annular seal.

4. A valve in accordance with claim 1, 2 or 3, in which the valve member includes a conical shoulder positioned to be biassed outwardly against one of the annular seals by the said resilient means, so that when the valve member is in the inoperative position the internal pressure in the container tends to improve the seal.

5. A valve in accordance with any one of the preceding claims, in which the said annular seals are each formed by an annulus

of elastomeric sheet material deformed in an inwardly dished shape by constraining means.

6. An aerosol metering valve substantially as herein described with reference to Figure 1, 2 or 3 of the accompanying drawings.

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2 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheet 1

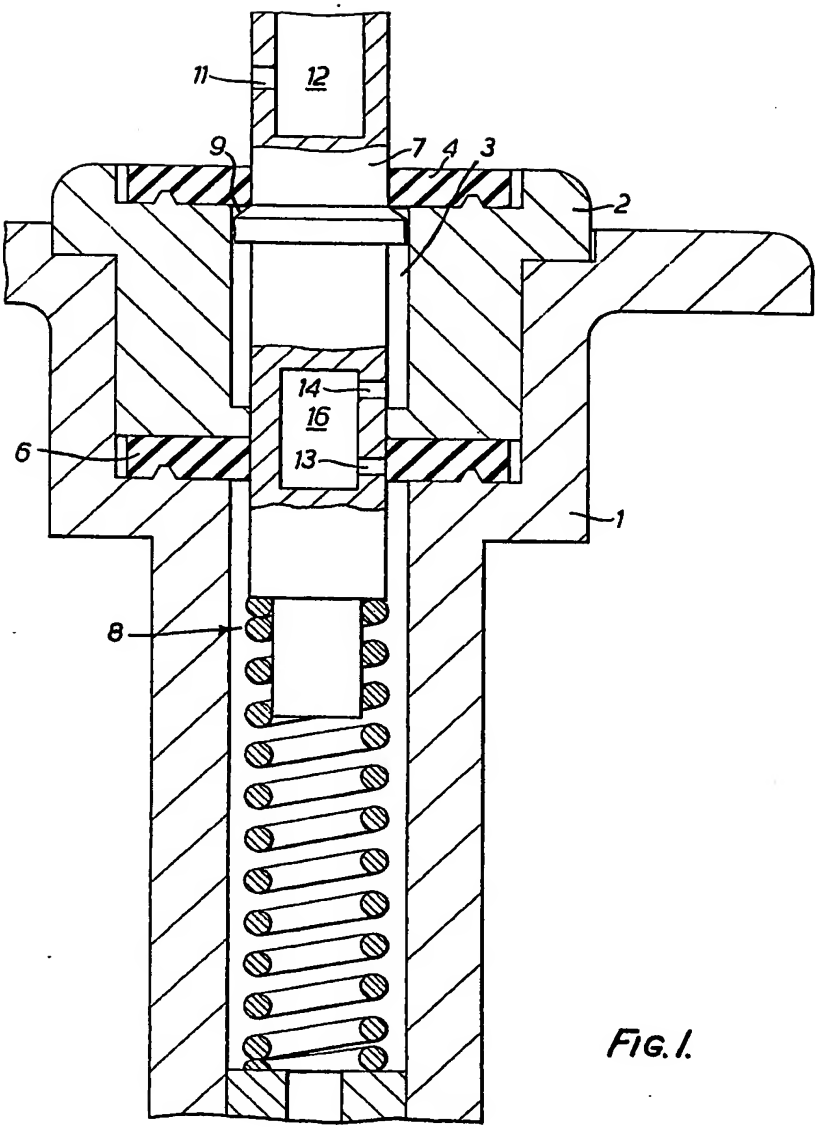

FIG. 1.

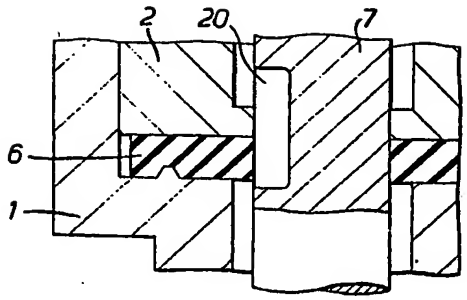

FIG. 2.

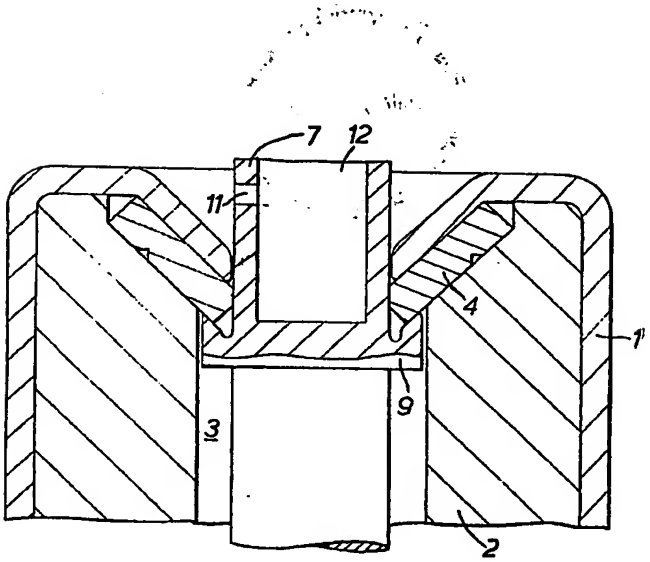

FIG. 3.